

**BY ORDER OF THE COMMANDER
AIR FORCE MATERIEL COMMAND**

**AIR FORCE MATERIEL COMMAND
INSTRUCTION 15-102**



5 MARCH 2014

Weather

***TERRESTRIAL AND SPACE WEATHER
SUPPORT ACROSS THE INTEGRATED
LIFE CYCLE MANAGEMENT
FRAMEWORK***

COMPLIANCE WITH THIS PUBLICATION IS MANDATORY

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This instruction implements the objectives of AFPD 15-1, *Air Force Weather Operations*, by providing guidance, identifying, establishing and sustaining terrestrial and space weather support to Air Force (AF) acquisition processes and supporting research, development, test, and evaluation (RDT&E). It establishes policy and procedures for managing Air Force Materiel Command (AFMC) terrestrial and space weather support to Air Force acquisition programs and technology-based efforts. It identifies the responsibilities to determine, document and coordinate terrestrial and space weather support requirements of Air Force acquisition programs from concept through system retirement, including deployment and some aspects of employment in accordance with AFPD 63-1, *Integrated Life Cycle Management*. This instruction specifies the development of documents detailing terrestrial and space weather support concepts and methodology. This publication may not be supplemented by lower organizational elements. Refer recommended changes and questions about this publication to the Office of Primary Responsibility (OPR) using the AF Form 847, *Recommendation for Change of Publication*; route AF Forms 847 from the field through the appropriate functional chain of command. The authorities to waive wing/unit level requirements in this publication are identified with a Tier ("T-0, T-1, T-2, T-3") number following the compliance statement. See AFI 33-360, *Publications and Forms Management*, Table 1.1 for a description of the authorities associated with the Tier numbers. Submit requests for waivers through the chain of command to the appropriate Tier waiver approval authority, or alternately, to the Publication OPR for non-tiered

compliance items. Ensure that all records created as a result of processes prescribed in this publication are maintained in accordance with (IAW) Air Force Manual (AFMAN) 33-363, *Management of Records*, and disposed of IAW the Air Force Records Information Management System (AFRIMS) Records Disposition Schedule (RDS).

SUMMARY OF CHANGES

This document is substantially revised and must be completely reviewed. The revised AFMCI 15-102 strengthens support to acquisition and RDT&E by providing a framework for collaboration ensuring terrestrial and space weather sensitivities are accounted for during the entire life cycle of a program or effort. It provides guidance to the field regarding information that can help determine impacts to current and future programs/efforts, value-added to programs/efforts and insight into emerging weapon systems for operational planning/support.

1. Acquisition Weather Support.

1.1. Purpose. To ensure the success of acquisition, RDT&E efforts across AFMC with integrated weather support. This instruction outlines processes and provides guidance to ensure meteorological expertise, knowledge and related infrastructures are aligned and integrated appropriately within AF acquisition related activities.

1.2. Objective. To support operationally relevant and cost effective research, development, deployment, sustainment and improvement of AF weapon systems. Meteorological subject matter experts throughout AFMC and lead commands identify support requirements, resolving/mitigating deficiencies and/or gaps, and integrating meteorological intelligence into the Life Cycle Management of weapons systems. Research, acquisition, test and space weather meteorologists can be assigned and embedded within AFMC to provide support for organizations to include the Air Force Research Laboratory (AFRL), Air Force Life Cycle Management Center (AFLCMC), Air Force Sustainment Center (AFSC), Air Force Test Center (AFTC), Air Force Nuclear Weapons Center (AFNWC) and HQ AFMC. These research, acquisition, staff and space weather meteorologists will be collectively referred to as “staffmets” through the entirety of this instruction. Staffmets perform or support basic research, development, acquisition and testing of AF weapon systems and capabilities by identifying, documenting and providing assistance to resolve environmental sensitivity issues to support acquisition programs. Staffmets also prepare the Air Force and Army operational terrestrial and space weather communities to support new weapon system development/implementation by assisting lead commands with defining tactics, training, and procedures for operational support.

2. Roles and Responsibilities.

2.1. HQ AFMC/A3 responsibility. HQ AFMC/A3OW will:

2.1.1. Provide organizational structure, training guidance/recommendations, recommended equipment/tools to manage all operational and acquisition weather support within the command. Maintain awareness and advise leadership both within the command and at Headquarters Air Force (HAF) and the Air Force Weather Agency (AFWA) on emerging technology areas requiring specialized terrestrial and space weather support. Work with AFRL Space Weather Subject Matter Experts for advice, help and support as needed to

support leadership briefings on Space Weather effects. Manage staffnets to support materiel solutions. (T-2)

2.1.2. Provide functional oversight, policy guidance and assistance to staffnets; assist with resolving manpower shortfalls; visit supported organizations to determine requirements for meteorological assistance; assist customers in analyzing environmental sensitivities of systems, assess the need for terrestrial and space weather support (e.g., for C4I systems, models and simulations), evaluate the need for other types of weather support (e.g., data collection campaigns, terrestrial and space weather effects tools); provide or arrange for support and request assistance from other agencies, as needed. (T-2)

2.1.3. Review requirements documents and appropriate information sources (e.g., databases, reports, etc.) for operational thresholds and potential impacts related to the supported program/project/work unit and provide affected organizations guidance, as needed. (T-2)

2.1.4. Semiannually (May and November), review “Program/Project/Work Unit” Briefs (Attachment 2), “Value Added” reports (Attachment 3) and “Emerging Technologies and Weapon Systems” reports (Attachment 4) and distribute to Air Force Weather functional staffs and other offices as needed for their planning, programming and budgeting. (T-2)

2.1.5. Assist staffnets, as needed, with support required for the transition from Developmental Test and Evaluation (DT&E) to Operational Test and Evaluation (OT&E), or in providing/arranging for support if DT&E and OT&E are combined. (T-2)

2.1.6. Facilitate, as needed, interactions between HAF, AFWA, MAJCOMs, Field Operating Agencies, AFMC Centers/Directorates/offices and Army Acquisition on issues concerning terrestrial and space weather support requirements and acquisition processes. (T-2)

2.1.7. Assist staffnets with professional development. This includes working with the supported unit for coding of acquisition positions to support attainment of program management level 1, systems engineering level 1 and test level 1 certifications, as needed. This includes assistance with continuation training to include recommended online, formal classes/courses, symposiums, conferences, etc. Manage a crossfeed program to exchange technical, acquisition and other appropriate information within AFMC and among other interested offices. The intent is to help the staffnets understand how and where terrestrial and space weather can influence a program/project/work unit or new initiative throughout its life cycle. (T-2)

2.2. Staffnets supporting AFMC. Staffnets will:

2.2.1. Identify, in coordination with lead commands and AFMC/A3OW, tactics, techniques and procedures for new weapon systems supported throughout the Air Force Weather (AFW) community as outlined by the Defense Acquisition System. Identification practices should include research in AF, designated DoD agencies and approved private institutions and conducting comprehensive gap analysis to reveal potential meteorological support and capability gaps or deficiencies. (T-2)

2.2.2. Determine and communicate to lead command and AFMC/A3OW organizational meteorological support requirements to include assisting customers in analyzing environmental sensitivities of systems, assessing the need for weather support (e.g., for C4I systems, models and simulations), evaluating other types of weather support requirements (e.g., data collection campaigns, weather effects tools); providing or arranging for support, and requesting assistance from other agencies as needed. (T-2)

2.2.3. Identify and document in direct coordination with program/project/work unit offices, environmental thresholds in DoD procurement and acquisition policies/documentation (e.g. DFARS and DoD Directive 5000.01), as required. Documentation will include system terrestrial and space weather sensitivity impacts and potential design criteria impacts for the supported effort. Identify potential weather support shortfalls to supported offices and HQ AFMC/A3OW. (T-2)

2.2.4. Provide or arrange for environmental support to customer programs during RDT&E; coordinate test criteria and meteorological support for weather sensitive systems under test and programs as initiated and updated by the program/project/work unit office; consult with the T&E support agency on any DT/OT&E weather support requirements. (T-2)

2.2.5. Submit semi-annual program/project/work unit briefs to HQ AFMC/A3OW on 15 April and 15 October, on all programs requiring terrestrial and space weather support at their location, in accordance with Attachment 2. Coordinate the draft program/project/work unit brief with the program/project/work unit office. If no change has occurred since the last submission, report "no change." (T-2)

2.2.6. Prepare and submit to HQ AFMC/A3OW, or make available electronically, reports of "Value-Added" of their services (Attachment 3). Reports will be semi-annual, due 15 April and 15 October, and an interim report when a project or major tasking is completed. (T-2)

2.2.7. Prepare and submit "Emerging Technologies and Weapon Systems" report (Attachment 4) by 15 October. Reports will be an annual assessment to help terrestrial and space weather planners at all levels to take into account emerging technologies and weapon systems being developed by and for DoD that may or will have terrestrial and space weather sensitivities and may or will need weather support capabilities. Emphasis is on identifying new or enhanced weather support capabilities that are not yet available or planned, and will be needed to support future developmental testing and operations, but before it is to be operationally tested and fielded. (T-2)

2.2.8. Provide consultation services related to development of the terrestrial and space weather support concept of operations (CONOPS) for new systems, and on operating, environmental support, and modeling and simulation requirements for inclusion in system requirements documents as needed/requested. (T-2)

2.2.9. Review all publications listed in Attachment 1 of this instruction. (T-2)

2.2.10. Complete initial and continuation training to include completing the requirements for Program Management, Test and Systems Engineering level 1 certification through Defense Acquisition University. Complete recommended meteorological and acquisition online courses, formal classes/courses, symposiums, conferences, etc. Review key

references cited in this instruction (Attachment 1) and the Acquisition Intelligence Guidebook (AIG) to help understand how and where weather can influence a program/project/work unit/new initiative throughout its life cycle and how that process is managed. Maintaining and pursuing professional development is critical to providing the best possible support to customers. (T-2)

2.3. Acquisition and RDT&E leaders/directors. Program Managers, Single Managers, Product Directors, Technology Directors, Development Planning Team Leaders, or Initiative Leads will:

2.3.1. Consult with assigned staffmets to ensure terrestrial and space weather effects are considered in program/project/work unit capability and requirements development, planning, and processes. (T-2)

2.3.2. Provide staffmets access to program/project/work unit technical details, requirements, and capabilities so assessment of future weather sensitivities and weather support requirements can be determined and planned for by AFW community and acquisition/RDT&E program offices. (T-2)

2.4. Headquarters and Centers. HQ AFMC A/2/5, AFRL, AFLCMC, AFSC, AFTC, AFNWC will:

2.4.1. Consult with staffmets to ensure terrestrial and space weather effects and support requirements are assessed throughout the life cycle of portfolio/program/project/work unit technologies and weapon systems. (T-2)

2.4.2. Provide staffmets access to program/project/work unit technologies and weapon systems' technical details, requirements, and capabilities so assessment of weather sensitivities and weather support requirements can be planned. Staffmets need access from the beginning of concept definition and throughout the program's life cycle to provide technical assistance in mitigating the effects of adverse impacts from terrestrial and space weather phenomena to reduce R&D and acquisition costs, and ensure AF weather resources are prepared to support development, testing and fielding/operational employment of emerging technologies and weapon systems. (T-2)

2.4.3. Support professional development of assigned and/or attached staffmets to include acquisition professional development program certifications and continuation training. Provide recommendations for specialized classes/courses, symposiums, conferences, etc., that would provide further understanding to supported technologies/efforts. (T-2)

3. Acquisition.

3.1. Defense acquisition. The Defense Acquisition System is the management process by which, the DoD provides effective, affordable, and timely systems to the users as stated in DoD Directive 5000.01. An Acquisition Program is a directed, funded effort that provides a new, improved, or continuing materiel, weapon or information system, or service capability in response to an approved need. A simplified and flexible management framework for translating capability needs and technology opportunities, based on approved capability needs, into stable, affordable, and well-managed acquisition programs that include weapon systems, services, and automated information systems is outlined in DoD Instruction 5000.02.

3.1.1. Terrestrial and space weather personnel are key players within the AF acquisition process. Staffmets provide all necessary technical advice, information, and aid, from terrestrial and space weather perspectives, to AFMC acquisition programs/projects/work units through all phases of the acquisition life cycle. Staffmets work with the respective program/project/work unit offices to identify and quantify weather sensitivities.

3.1.2. Staffmets identify weather support requirements for AF acquisition and technology-based programs. Staffmets ensure weather support requirements and resources are identified in technology and acquisition documents, such as the Test and Evaluation Master Plan through the supported program/project/work unit offices. They ensure new resource requirements potentially impacting AFW are identified for HAF and AFWA as the AFW Lead Command.

3.2. Development planning (DP). DP encompasses the engineering analysis and technical planning activities that provide the foundation for informed investment decisions on the fundamental path a materiel development will follow to effectively and affordably meet operational needs (DoDI 5134.16). Some DP is performed proactively, in anticipation of future needs per AFI 63-1.

3.2.1. Staffmets support the DP process by assisting with the translation of operational deficiencies into technology needs in the earliest stages of the acquisition process. Successful translation requires an intimate understanding of warfighter needs, and a close interaction with industry, the Science and Technology (S&T) community, academia, AFRL's Battlespace Environment Lab and with the AFMC Program Offices to develop materiel and non-materiel solutions for identified shortfalls. StaffMets must work within these established acquisition processes to ensure systems are developed to work effectively in their intended terrestrial and space environments. AFRL's significant investment, expertise, knowledge and interface to the S&T community for Space Weather needs to an explicit part of this process, particularly in the Space Weather domain.

3.2.2. Staffmets are a key component in the Integrated Life Cycle Management of weapon systems. They assist with the application of standard systems engineering processes and practices to ensure the integrity, mission assurance, operational safety, suitability, and effectiveness (OSS&E) of each system throughout its life cycle from concept development through disposal IAW AFPD 63-1.

WILLIAM J. THORNTON, Brigadier General, USAF
Director of Air, Space and Information Operations

Attachment 1**GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION*****References***

CJCSI 3170.01, *Joint Capabilities Integration and Development System*, 10 January 2012

DoDD 5000.01, *The Defense Acquisition System*, 12 May 2003

DoDI 5000.02, *Operation of the Defense Acquisition System*, 8 December 2008

DoDI 5134.16, *Deputy Assistant Secretary of Defense for Systems Engineering (DASD(SE))*”, 19 Aug 2011

AFPD 10-6, *Capabilities-Based Planning & Requirements Development*, 31 May 2006

AFI 10-601, *Operational Capability Requirements Development*, 12 July 2010

AFPD 10-9, *Lead Command Designation and Responsibilities for Weapon Systems*, 8 March 2007

AFI 10-901, *Lead Operating Command--Communications and Information Management*, 22 March 2001

AFPD 15-1, *Air Force Weather Operations*, 19 February 2010

AFPD 61-1, *Management of Science and Technology*, 18 August 2011

AFPD 63-1, *Integrated Life cycle Management*, 3 July 2012

AFI 63-101, *Acquisition and Sustainment Life cycle Management*, 8 April 2009

AFI 63-1201, *Life cycle Systems Engineering*, 23 July 2007

AFPD 99-1, *Test and Evaluation Process*, 22 July 1993

AFI 99-101, *Developmental Test and Evaluation*, 1 November 1996

AFI 99-102, *Operational Test and Evaluation*, 1 July 1998

AFI 99-103, *Capabilities-Based Test and Evaluation*, 26 February 2008

AFI 99-106, *Joint Test and Evaluation Program*, 26 August 2009

Attachment 2

PROGRAM/PROJECT WORK UNIT BRIEF FORMAT (UNCLASSIFIED/CLASSIFIED AS NEEDED)

Table A2.1. Program/Project work Unit Brief Format

PROJECT/PROGRAM: Next Generation Disintegrating Ray Gun**DATE OF LAST UPDATE:** 1 Apr 2012**PURPOSE/PROGRAM DESCRIPTION:** (GENERAL OVERVIEW OF PROGRAM/PROJECT/WORK UNIT)

The purpose of this program is to develop and field a disintegrating ray gun, a man portable hand weapon with adjustable capabilities, capable of melting through structures or rendering enemy personnel unconscious.

ENVIRONMENTAL SENSITIVITIES: (ANYTHING THAT WILL AFFECT THE OPERATION, EMPLOYMENT OR SUPPORT OF THE PROGRAM/PROJECT/WORK UNIT OR ITS SUPPORT SYSTEMS)

Abrasion of lens covers Electro-Magnetic field variations
 Absorption of energy by atmospheric gasses/particles/precipitation
 Exposure to space environment both near earth and inter-stellar

ANTICIPATED AFW SUPPORT REQUIREMENTS: (NEW TECHNOLOGIES, MODELS, MANNING REQUIREMENTS, OPERATIONS CHANGES OR EQUIPMENT REQUIRED TO SUPPORT THE PROGRAM THROUGHOUT ITS LIFE CYCLE)

Climatic atmospheric dust concentrations
 Forecast of Electro-Magnetic field densities
 Tactical Decision Aid (TDA) for range and lethality calculations

PROGRAM STATUS: (GENERALIZED TIME TABLE OF PROGRAM INCLUDING TEST PLANS, DEVELOPMENT, DEPLOYMENT, AND FIELDING)

Lead Command: ACC, AMC, AFSOC, etc.

Responsible Organization: AFRL/XXX

Milestones:

Request for Proposal (RFP): 1 Mar 2011

Concept Definition: 1 Feb 2012

DT & E: 1 Mar 2013

Critical Design Review: 1 Nov 2013

OT & E: 1 Apr 2014

Manufacture: 1 Jun 2015

Field: 1 Nov 2015

PAST/CURRENT/FUTURE SUPPORT: (MAJOR SUPPORT YOU HAVE PROVIDED OR PLAN TO PROVIDE TO SUPPORT THIS PROGRAM/PROJECT)

Helped define environmental requirements for RFP
Hosted technical working groups to define environmental sensitivities and support requirements
Established working group to define TDA requirements
Will monitor contract performance for TDA or TTP development

DATA AFW MIGHT BE ABLE TO USE: (ANY OUTPUT PARAMETERS FROM THIS PROGRAM WITH POTENTIAL WEATHER/SPACE APPLICATIONS)

Discharge data could assist AFW in determining atmospheric transmission and ionization properties

POINTS OF CONTACT: (POCs AT THE STAFFMET UNIT, PRODUCT CENTER, LABORATORY, TEST CENTER, MAJCOM, OR AIR STAFF)

Capt Fantastic (Program Manager) AFRL/XXX DSN 555-5555 email:
Mrs. F. Awesome (Deputy Program Manager) AFRL/XXX DSN 555-5556 email:

SUPPORTING DOCUMENTS: (ICD, CDD, CPD, CONOPS, etc.)

Intergalactic Expeditionary Force (IEF) CONOPS 08-001
Tactical Defense Systems, 1 Apr 09
IEF ICD 08-004/III
Multipurpose Focused Energy Portable Weapon, 1 Oct 10

ESTIMATED PROGRAM/PROJECT/INITIATIVE/EFFORT COST:

\$1.4B is estimated life cycle cost through FY22

Attachment 3

VALUE-ADDED REPORT GUIDANCE

A3.1. Value-added information: helps to quantify your contribution to a larger program/project/work unit or goal and may help substantiate the inherently governmental nature of the supporting work. Negative-type reports can also contain valuable information, such as money wasted through unnecessary contracts when in-house staffnet support was available but not used; retroactive fixes that could have been prevented with appropriate early staffnet involvement; or inadequate support for testing of fielded systems due to lack of development efforts in another area. Tie your value added reports and/or support to time saved, which should translate to dollars and cost savings, if possible. Quantifying what value we add is meaningful to others and helps us all in the long run. When first defining, or redefining, support to a particular program or project, try to evaluate and prioritize the benefits you foresee for each contribution. A sense of where the biggest payoffs are for the program may help structure your efforts.

A3.2. Minimum Value-Added Report Items

A3.2.1. Cost/Financial Impact:

A3.2.1.1. Saved cost of hiring a contractor, which translates to \$175K

A3.2.1.2. Advice resulted in purchase of best-value equipment saving \$20K

A3.2.2. Schedule Impact:

A3.2.2.1. Enabled program to get ahead of schedule by 3 months

A3.2.2.2. Testing completed 3 days early due to forecast saving \$150K/day

A3.2.3. Performance Impact:

A3.2.3.1. Advice resulted in design change, saving \$30M

A3.2.3.2. Enhanced the performance of a system – increased accuracy by 12%

A3.3. Specific examples:

A3.3.1. Damage to telescope mirror due to icing would cost \$1M in repair and 6 months downtime.

A3.3.2. Without weather support, \$400K per year could be wasted in unproductive attempts to test.

A3.3.3. Extended sensor window coating life by 300%; service life from 5 years to 15 years.

A3.3.4. Weather support saves 10% of program costs per year, which translates to \$1.3M for FY12.

A3.3.5. Located testing location for key crosswind parameter after program unsuccessfully tried three locations without weather consultation at a cost of \$2.4M.

A3.3.6. Test moved up three days due to forecasted conditions, saving \$1.5M in program costs.

A3.3.7. Sensor being re-designed due to weather input for unrealistic environment saving \$14.5M.

Attachment 4**EMERGING TECHNOLOGIES AND WEAPON SYSTEMS REPORT
FORMAT(UNCLASSIFIED/CLASSIFIED AS NEEDED)**

A4.1. Reports will be an annual assessment to help weather planners at all levels to take into account emerging technologies and weapon systems being developed by and for DoD that may or will have weather sensitivities and may or will need weather support capabilities. Emphasis is on identifying new or enhanced weather support capabilities that are not yet available or planned, and will be needed to support future testing and operations, but well before it is to be tested and fielded.

A4.2. Within each section provide an assessment of groups of technology (e.g. hypersonics, hyperspectral, ultraspectral, nanotechnology, visual and acoustic stealth, teleporting) categories or weapon systems (e.g. laser weapons in lower troposphere, Next Generation Strike Aircraft) being developed and your assessment as to current and planned weather support capabilities and whether there are shortfalls, capability gaps in weather support capabilities expected during the time frames and whether new capabilities are needed and your estimate of what is needed before these technologies and systems are tested and fielded. Provide source for detailed information on each program/technology (e.g. your Project Brief, technical white paper, technical article in journal, etc). Please provide as many specifics as possible to include specific dates for when testing will begin, IOC/FOC, specific weather sensitivities or specific weather support needed to exploit technology or system operationally, new capabilities or enhancements needed for terrestrial weather, space weather forecast models and observation systems/platforms to include new parameters to be observed/forecasted. Try to determine if developer is willing to provide funding for development of necessary weather support capabilities. Reports are normally unclassified, but can include a classified portion when necessary through appropriate classified channels.

A4.3. Emerging Technologies

A4.3.1. Near-Term (Current to next 5 years)

A4.3.2. Mid-Term (5 to 15 years)

A4.3.3. Far-Term (Greater than 15 years)

A4.4. Emerging Weapon Systems

A4.4.1. Near-Term (Current to next 5 years)

A4.4.2. Mid-Term (5 to 15 years)

A4.4.3. Far-Term (Greater than 15 years)